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器件制备及器件物理

光纤聚合物探针在非均匀电磁场下的银纳米颗粒极化效应

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摘要：介绍了光纤探针的制作流程及纳米颗粒的吸附方法,利用时域有限差分法对光纤探针的局域非均匀场下银纳米颗粒增强效应进行了数值模拟。首先,分析了不同形状的光纤聚合物探针尖端电场分布情况,为纳米颗粒的极化效应研究提供了参考;其次,模拟与仿真了纳米颗粒的半径、与探针间的距离对单个银纳米颗粒极化效应的影响;最后,以两个银纳米颗粒为例讨论了颗粒相对位置对极化效果的影响,并证明了光纤探针顶端以外的银纳米颗粒对电场的极化效应没有贡献。本文的仿真结果为光纤探针的制备以及其表面银纳米颗粒的吸附提供了理论支持。

关键词： 纳米颗粒 光纤探针 非均匀场 FDTD

Inhomogeneous Electromagnetic Field Polarization Enhancement of Silver Nanoparticles Induced by A Fiber Optics Polymer Probe

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Abstract: The process of optical fiber probe production was introduced in this paper, as well as the attachment of silver nanoparticles, the enhanced effect of silver nanoparticles in fiber-optic probe inhomogeneous electromagnetic field of was simulated using the finite difference time domain method. Firstly, the electric field distribution of different shapes of the fiber polymer probe tip was discussed, and it provided a reference for the research of nanoparticles polarization effects; Secondly, the polarization affecting factors of single nanoparticle were simulated, the radius of silver nanoparticle and its distance to the probe were taken into consideration; Finally, taking two silver nanoparticles for example, the polarization effect of particles relative position were discussed, which proved that the silver nanoparticles outside the top of the fiber probe do not contribute to the polarization effect. The simulation results of this paper provided a theoretical support for the production of the fiber-optic probe and the attachment of metal nanoparticles.

Keywords: nanoparticle optical fiber probe inhomogeneous field FDTD

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